FORM 2

THE PATENTS ACT, 1970

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COMPLETE SPECIFICATION

(See sections 10 & rule 13)

1. TITLE OF THE INVENTION

A SYSTEM FOR RECOMMENDING A RELEVANT QUERY USING A STATISTICAL METHOD

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3. PREAMBLE TO THE DESCRIPTION
COMPLETE SPECIFICATION The following specification particularly describes the invention and the manner in which it is to be performed.

A SYSTEM FOR RECOMMENDING A RELEVANT QUERY USING A STATISTICAL METHOD

TECHNICAL FIELD

[0001] The present disclosure relates to field of recommending a relevant query to a user for enriching user experience. In particular, the present disclosure relates to a device, a system for recommending at least one relevant query, using a statistical method, based on an input query received from a user.

BACKGROUND

[0002] The background description includes information that may be useful in understanding the present invention. It is not an admission that any of the information provided herein is prior art or relevant to the presently claimed invention, or that any publication specifically or implicitly referenced is prior art.

[0003] In the recent age, the use of modern technology has resulted in increased usage of online websites such as shopping websites, search engines and the like, for exploring knowledge and for enhanced shopping experience. Any user of online forum may need to type their query in a natural language which may be processed by a processing system to obtain the closest information available, with respect to the query. However, most of the users may not get a desired result either due to lack of right usage of terms in their query. To address this issue, a solution or product may be needed that can predict queries arising in future for a user that can help in holistic development.

[0004] The methods in the art may present any similar query based on several ways such as a query for which top answer may be voted by a forum. The limitation herein may be that the suggested questions may not align closely with the query that the user had presented to the forum, and the majority of the suggested questions may be sometimes drastically different from the original query. Other search engines may suggest similar questions based on past search history. Although some systems or methods in the art use either a semantic approach that may propose a query based on similar meaning derived from the original query by the user, or a syntactic approach that may propose a query based on similar usage of words, however, the chances of obtaining a relevant query may be very less, as only syntactic approach may be bad at selection of similar queries and only semantic approach may be bad at rejecting dissimilar questions.

[0005] Therefore, there is a need in the art, for suggesting relevant queries to a user. More particularly, a need therefore exists to provide systems, methods, devices and apparatuses to recommend a relevant query in response to an input query received from a user that may save time and efforts of the user to obtain necessary information, and hence provide an improved user experience.

OBJECTS OF THE PRESENT DISCLOSURE

[0006] Some of the objects of the present disclosure, which at least one embodiment herein satisfies are as listed herein below.

[0007] It is an object of the present disclosure to provide a device, system and method for recommending a relevant query to a user in response to an input query.

[0008] It is an object of the present disclosure to provide a device, system and method for recommending a relevant query that may enable enriched user experience.

[0009] It is an object of the present disclosure to provide a device, system and method for recommending a relevant query that save time/efforts of the user.

SUMMARY

[0010] In an aspect, the present disclosure provides a computing device for recommending at least one relevant query at least partially based on an input query received from a user. The computing device includes one or more processors coupled with a memory, the memory storing instructions which when executed by the one or more processors causes the computing device to receive the input query on a display of the computing device; compute, in response to the input query, an output recommending at least one relevant query selected from one or more queries in a dataset, wherein the output may be computed based on a similarity between the input query and each of the one or more queries at an evaluated optimum value of a weight factor (L) to recommend the at least one relevant query to the user in response to the input query; and display, for selection by the user, the output on the at least one relevant query on the computing device.

[0011] In an aspect, the present disclosure provides a system for recommending at least one relevant query based at least partially based on an input query received from a user. The system includes a computing device and one or more server computers having at least one processor connected to an interconnected network of computers, and communicably coupled to the computing device, wherein the one or more server computers may be configured to receive a first query and a dataset including one or more queries, wherein each

of the queries may be associated with a respective rank assigned with respect to the first query; compute a first rank for each of the queries with respect to the first query, wherein the first rank may be calculated based on similarity between the first query and each of the queries at a pre-defined value of a weight factor (L), wherein the weight factor (L) indicates an extent of at least one of a semantic similarity and a syntactic similarity between the first query and each of the queries; and evaluate an optimum value of the weight factor (L) based on a difference between the respective rank and the first rank.

[0012] The present disclosure provides a method for recommending at least one relevant query at least partially based on an input query received from a user. The method includes receiving, at a server, a first query and a dataset including one or more queries, wherein each of the queries may be associated with a respective rank assigned with respect to the first query; computing, at the server, a first rank for each of the queries with respect to the first query, wherein the first rank may be calculated based on similarity between the first query and each of the queries at a pre-defined value of a weight factor (L), wherein the weight factor (L) may indicate an extent of at least one of a semantic similarity and a syntactic similarity between the first query and each of the queries; evaluating, at the server, an optimum value of the weight factor (L) based on a difference between the respective rank and the first rank; receiving, at a computing device, the input query on a display of the computing device; computing, at the computing device, in response to the input query, an output recommending at least one relevant query selected from the one or more queries in the dataset, wherein the output may be computed based on a similarity between the input query and each of the one or more queries at the evaluated optimum value of a weight factor (L) to recommend the at least one relevant query to the user in response to the input query; and displaying, on the display of the computing device, for selection by the user, the output on the at least one relevant query on the computing device.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] In the figures, similar components and/or features may have the same reference label. Further, various components of the same type may be distinguished by following the reference label with a second label that distinguishes among the similar components. If only the first reference label is used in the specification, the description is applicable to any one of the similar components having the same first reference label irrespective of the second reference label.

[0014] The diagrams are for illustration only, which thus is not a limitation of the present disclosure, and wherein:

[0015] FIG. 1 illustrates exemplary network architecture in which or with which proposed system may be implemented, in accordance with an embodiment of the present disclosure.

[0016] FIG. 2 illustrates an exemplary representation (200) of a computing device (104) or a centralized server (150) to recommend at least one relevant query, in accordance with an embodiment of the present disclosure.

[0017] FIG. 3 is a flow diagram illustrating steps of a method (300) for recommending at least one relevant query at least partially based on an input query received from a user, in accordance with an embodiment of the present disclosure.

[0018] FIG. 4A is an exemplary representation (400) depicting a summary of method for recommending at least one relevant query, in accordance with an embodiment of the present disclosure.

[0019] FIG. 4B is an exemplary representation (470) depicting a dataset that is received at a computing device (104), in accordance with an embodiment of the present disclosure.

[0020] FIG. 4C is an exemplary representation depicting a summary for evaluation of the weight factor (L), in accordance with an embodiment of the present disclosure.

[0021] FIG. 4D is an exemplary representation (480) depicting an input query entered by a user and an output query generated by the computing device (104), in accordance with an embodiment of the present disclosure.

[0022] FIG. 5 illustrates an exemplary system in which or with which embodiments of the present invention may be utilized in accordance with embodiments of the present disclosure.

DETAILED DESCRIPTION

[0023] The following is a detailed description of embodiments of the disclosure depicted in the accompanying drawings. The embodiments are in such detail as to clearly communicate the disclosure. However, the amount of detail offered is not intended to limit the anticipated variations of embodiments; on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the present disclosure as defined by the appended claims.

[0024] In the following description, numerous specific details are set forth in order to provide a thorough understanding of embodiments of the present invention. It will be apparent to one skilled in the art that embodiments of the present invention may be practiced without some of these specific details. Embodiments of the present invention include various steps, which will be described below. The steps may be performed by hardware components or may be embodied in machine-executable instructions, which may be used to cause a general-purpose or special-purpose processor programmed with the instructions to perform the steps. Alternatively, steps may be performed by a combination of hardware, software, and firmware and/or by human operators.

[0025] If the specification states a component or feature "may", "can", "could", or "might" be included or have a characteristic, that particular component or feature is not required to be included or have the characteristic.

[0026] As used in the description herein and throughout the claims that follow, the meaning of "a," "an," and "the" includes plural reference unless the context clearly dictates otherwise. Also, as used in the description herein, the meaning of "in" includes "in" and "on" unless the context clearly dictates otherwise.

[0027] Exemplary embodiments will now be described more fully hereinafter with reference to the accompanying drawings, in which exemplary embodiments are shown. These exemplary embodiments are provided only for illustrative purposes and so that this disclosure will be thorough and complete and will fully convey the scope of the invention to those of ordinary skill in the art. The invention disclosed may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein. Various modifications will be readily apparent to persons skilled in the art. The general principles defined herein may be applied to other embodiments and applications without departing from the spirit and scope of the invention. Moreover, all statements herein reciting embodiments of the invention, as well as specific examples thereof, are intended to encompass both structural and functional equivalents thereof. Additionally, it is intended that such equivalents include both currently known equivalents as well as equivalents developed in the future (i.e., any elements developed that perform the same function, regardless of structure). Also, the terminology and phraseology used is for the purpose of describing exemplary embodiments and should not be considered limiting. Thus, the present invention is to be accorded the widest scope encompassing numerous alternatives, modifications, and equivalents consistent with the principles and features disclosed. For the purpose of clarity, details relating to technical material that is known in the technical fields related to the

invention have not been described in detail so as not to unnecessarily obscure the present invention.

[0028] Thus, for example, it will be appreciated by those of ordinary skill in the art that the diagrams, schematics, illustrations, and the like represent conceptual views or processes illustrating systems and methods embodying this invention. The functions of the various elements shown in the figures may be provided through the use of dedicated hardware as well as hardware capable of executing associated software.

[0029] Embodiments of the present invention may be provided as a computer program product, which may include a machine-readable storage medium tangibly embodying thereon instructions, which may be used to program the computer (or other electronic devices) to perform a process. The term "machine-readable storage medium" or "computer-readable storage medium" includes, but is not limited to, fixed (hard) drives, magnetic tape, floppy diskettes, optical disks, compact disc read-only memories (CD-ROMs), and magneto-optical disks, semiconductor memories, such as ROMs, PROMs, random access memories (RAMs), programmable read-only memories (PROMs), erasable PROMs (EPROMs), electrically erasable PROMs (EEPROMs), flash memory, magnetic or optical cards, or other type of media/machine-readable medium suitable for storing electronic instructions (e.g., computer programming code, such as software or firmware).A machine-readable medium may include a non-transitory medium in which data may be stored and that does not include carrier waves and/or transitory electronic signals propagating wirelessly or over wired connections. Examples of a non-transitory medium may include but are not limited to, a magnetic disk or tape, optical storage media such as compact disk (CD) or digital versatile disk (DVD), flash memory, memory or memory devices. A computer program product may include code and/or machine-executable instructions that may represent a procedure, a function, a subprogram, a program, a routine, a subroutine, a module, a software package, a class, or any combination of instructions, data structures, or program statements. A code segment may be coupled to another code segment or a hardware circuit by passing and/or receiving information, data, arguments, parameters, or memory contents. Information, arguments, parameters, data, etc. may be passed, forwarded, or transmitted via any suitable means including memory sharing, message passing, token passing, network transmission, etc.

[0030] Systems depicted in some of the figures may be provided in various configurations. In some embodiments, the systems may be configured as a distributed system where one or more components of the system are distributed across one or more networks in a cloud computing system.

[0031] Each of the appended claims defines a separate invention, which for infringement purposes is recognized as including equivalents to the various elements or limitations specified in the claims. Depending on the context, all references below to the "invention" may in some cases refer to certain specific embodiments only. In other cases, it will be recognized that references to the "invention" will refer to subject matter recited in one or more, but not necessarily all, of the claims.

[0032] All methods described herein may be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or exemplary language (e.g., “such as”) provided with respect to certain embodiments herein is intended merely to better illuminate the invention and does not pose a limitation on the scope of the invention otherwise claimed. No language in the specification should be construed as indicating any non-claimed element essential to the practice of the invention.

[0033] The present disclosure relates to field of recommending a relevant query to a user for enriching user experience. In particular, the present disclosure relates to a device, a system and a method for recommending at least one relevant query at least partially based on an input query received from a user.

[0034] In an aspect, the present disclosure provides a computing device for recommending at least one relevant query at least partially based on an input query received from a user. The computing device includes one or more processors coupled with a memory, the memory storing instructions which when executed by the one or more processors causes the computing device to receive the input query on a display of the computing device; compute, in response to the input query, an output recommending at least one relevant query selected from one or more queries in a dataset, wherein the output may be computed based on a similarity between the input query and each of the one or more queries at an evaluated optimum value of a weight factor (L) to recommend the at least one relevant query to the user in response to the input query; and display, for selection by the user, the output on the at least one relevant query on the display of the computing device.

[0035] In an aspect, the present disclosure provides a system for recommending at least one relevant query based at least partially based on an input query received from a user. The system may include a computing device and one or more server computers having at least one processor connected to an interconnected network of computers, and communicably coupled to the computing device, wherein the one or more server computers may be configured to receive a first query and a dataset including one or more queries, wherein each

of the queries are associated with a respective rank assigned with respect to the first query; compute a first rank for each of the queries with respect to the first query, wherein the first rank is calculated based on similarity between the first query and each of the queries at a pre-defined value of a weight factor (L), wherein the weight factor (L) indicates an extent of at least one of a semantic similarity and a syntactic similarity between the first query and each of the queries; and evaluate an optimum value of the weight factor (L) based on a difference between the respective rank and the first rank.

[0036] The term "syntactic similarity" refers to a similarity based on common usage of words. The term "semantic similarity" refers to a similarity based on common meaning or logic.

[0037] FIG. 1 illustrates an exemplary network architecture in which or with which proposed system (100) can be implemented in accordance with an embodiment of the present disclosure. As illustrated in FIG. 1, a computing device (104) may be used by a user (102) for communicating an input query. The computing device (104) may be communicatively coupled with a centralized server (112) through a network (104). The centralized server (112) may be communicably coupled to an administrative device (108), to receive a first query and a dataset including one or more queries. The computing device (104) or the centralized server (112) can be implemented using any or a combination of hardware components and software components.

[0038] In an implementation, the computing device (104) can be accessed by applications residing on any operating system, including but not limited to, Android™, iOS™, and the like. Examples of the computing devices (104) can include but are not limited to, a portable computer, a personal digital assistant, a handheld device, and a workstation. The user (102) can provide an input query to the computing device (104) through one or more input devices connected thereto. In a preferred embodiment, the computing devices (104) may be mobile phones associated with respective input devices. In an embodiment, the input device connected to the computing device (104) can include a touch pad, touch enabled screen of a computing device that may form a part of the computing device such that it forms part of the computing device (104). In another embodiment, the input device connected to the computing device (104) can be in the form of an externally connected device or peripheral device including, but not limited to, a keyboard, a mouse and the like. The computing device (104) may include an interface, which may have a display for obtaining the output in response to the input query. The input query may be in form of any or a combination of a question, a sentence and a set of keywords. In an embodiment, the computing device (104)

may use a natural language communication for providing improved results with respect to generating the relevant query. In an embodiment, the user (102) may be a customer, an employee, a consumer or a buyer interacting with the computing device (104) to gain information regarding a topic, wherein the computing device may recommend relevant queries to the user (102).

[0039] FIG. 2 illustrates an exemplary representation (200) of a computing device (104) or the centralized server (112) to recommend at least one relevant query, in accordance with an embodiment of the present disclosure. The centralized server (112) that may be one or more server computers (112) having at least one processor (202) may be connected to an interconnected network of computers, and communicably coupled to the computing device (104). The one or more server computers (112) may be configured to receive first query and dataset including one or more queries, wherein each of the queries may be associated with a respective rank assigned with respect to the first query. The dataset may include the one or more queries ranked in order of relevance of each of the one or more queries with respect to the first query. The first query and the dataset may be received at the one or more server computers (112) from the administrative device (108) that may be used by an administrator or any other administrative personnel using the input device (107). The respective rank associated with each of the queries with respect to the first query may be assigned by an administrator. In an embodiment, the administrator may be any official person accessing the administrative device (108) or the centralized server (112) to update the database (230). The one or more server computers (112) may compute a first rank for each of the queries with respect to the first query. In an embodiment, the first rank may be calculated based on similarity between the first query and each of the queries at a pre-defined value of a weight factor (L). The weight factor (L) indicates an extent of at least one of a semantic similarity and a syntactic similarity between the first query and each of the queries. The weight factor (L) may be in the in the range of 0 to 1, wherein value of weight factor (L) equal to 0 indicates the semantic similarity and the value of weight factor (L) equal to 1 indicates the syntactic similarity. The one or more server computers (112) may evaluate an optimum value of the weight factor (L) based on a difference between the respective rank and the first rank. In an embodiment, the dataset may be stored in database (230) of a server (112). The evaluation of the optimum value of the weight factor (L) may be a part of a training phase wherein the learned value of the weights may also be stored in the database (230) of the computing device (104) or the centralized server (112).The output response computed by the computing device (104) may be obtained in a usage phase.

[0040] In an embodiment, the computing device (104) may be used for recommending at least one relevant query at least partially based on an input query received from a user (102). The computing device (104) may include one or more processors (202) coupled with a memory (204), the memory (204) storing instructions which when executed by the one or more processors (202) may cause the computing device (104) to receive the input query on a display of the computing device (104); compute, in response to the input query, an output recommending at least one relevant query selected from one or more queries in a dataset, wherein the output may be computed based on a similarity between the input query and each of the one or more queries at an evaluated optimum value of a weight factor (L) to recommend the at least one relevant query to the user (102) in response to the input query; and display, for selection by the user (102), the output on the at least one relevant query on the display of the computing device (104). In an embodiment, the output may be displayed on the interface (106) or the display of the computing device (104).

[0041] In an embodiment, the optimum value of the weight factor (L) may be obtained based on least error value computed using sum of squared rank difference (SSRD) between the respective rank and the first rank. The SSRD value may be an indication of the error margin and hence may be used to evaluate the weight factor (L) that gives the least error. The SSRD value may be evaluated by summing square of the differences between the respective rank and the first rank for each of the queries with respect to the first query, to evaluate the optimum weight factor (L). Such calculation may be done for "n" number of first query, and the optimum L value may be an average of all the L values with least SSRD or the error obtained with respect to each of the first queries.

[0042] In an embodiment, the first rank may be obtained, at the pre-defined value of a weight factor (L), based on combination of similarity scores associated with the semantic similarity and the syntactic similarity between the first query and each of the queries. In another embodiment, the output may be recommended in order of a final rank associated with relevance of each of the one or more queries with respect to the input query, wherein the final rank may be obtained, at the optimum weight factor (L), based on combination of similarity scores associated with a semantic similarity and a syntactic similarity between the input query and each of the one or more queries.

[0043] The similarity scores may be calculated by using the following weightage:

L x Syntactic similarity + (1 - L) x Semantic similarity,

wherein the first rank may be evaluated at varying values of L in the range of 0 to 1, and the final rank may be evaluated at the optimum value of L derived at the server end.

[0044] The one or more processors (202) may be implemented as one or more microprocessors, microcomputers, microcontrollers, digital signal processors, central processing units, logic circuitries, and/or any devices that manipulate data based on operational instructions. Among other capabilities, the one or more processor(s) (202) may be configured to fetch and execute computer-readable instructions stored in a memory (204) of the computing device (104) or the centralized server (112). The memory (204) may store one or more computer-readable instructions or routines, which may be fetched and executed to create or share the data units over a network service. The memory (204) may comprise any non-transitory storage device including, for example, volatile memory such as RAM, or non-volatile memory such as EPROM, flash memory, and the like.

[0045] The computing device (104) or the centralized server (112) may also comprise an interface(s) (206). The interface(s) (206) may comprise a variety of interfaces, for example, interfaces for data input and output devices, referred to as I/O devices, storage devices, SCADA, Sensors and the like. The interface(s) (206) may facilitate communication of the computing device (104) or the centralized server (112) with various devices coupled to it. The interface (206) of the computing device (104) may also include a display for displaying the output in response to the input query. The interface(s) (206) may also provide a communication pathway for one or more components of the computing device (104) or the centralized server (112). Examples of such components include, but are not limited to, processing engine(s) (202) and database (230).

[0046] The one or more processors (202) may be implemented as a combination of hardware and programming (for example, programmable instructions) to implement one or more functionalities of the one or more processors (202). In examples described herein, such combinations of hardware and programming may be implemented in several different ways. For example, the programming for the one or more processors (202) may be processor executable instructions stored on a non-transitory machine-readable storage medium and the hardware for the one or more processors (202) may comprise a processing resource (for example, one or more processors), to execute such instructions. In the present examples, the machine-readable storage medium may store instructions that, when executed by the processing resource, implement the one or more processors (202). In such examples, the computing device (104) or the centralized server (112) may comprise the machine-readable storage medium storing the instructions and the processing resource to execute the instructions, or the machine-readable storage medium may be separate but accessible to the

computing device (104) or the centralized server (112) and the processing resource. In other examples, the one or more processors (202) may be implemented by electronic circuitry.

[0047] In an aspect, the database (230) may be configured to store any or a combination of the first query, the dataset including the one or more queries, the input query the optimum value of L and output in response to the input query. In another aspect, the database (230) may comprise data that may be either stored or generated as a result of functionalities implemented by any of the components of the processor (202) or the processing engines (208).

[0048] In an exemplary embodiment, the processing engine(s) (208) of the computing device (104) or the centralized server (112) may include a data receiving engine (210), a computing engine (214) and other engines (218), wherein the other engines (220) may further include, without limitation, recommendation engine, storage engine, or signal generation engine. The input data engine (210) may obtain at least one of the first query, the dataset including the one or more queries and the input query. The computing engine (214) may compute at least one of the first rank, an optimum weight factor (L) and the output in response to the input query.

[0049] In an embodiment, before computing the output, the one or more processors (202) may parse the input query to produce parsed concepts and keywords to find similarities between the parsed concepts and keywords with the one or more queries. In an embodiment, the output may include the one or more queries ranked in order of relevance of each of the one or more queries with respect to the input query.

[0050] FIG. 3 is a flow diagram illustrating steps of a method (300) for recommending at least one relevant query at least partially based on an input query received from a user (102), in accordance with an embodiment of the present disclosure. At 301, the method includes receiving, at server (112), a first query and dataset including one or more queries, wherein each of the queries are associated with a respective rank assigned with respect to the first query. At 302, the method includes computing, at the server (112), a first rank for each of the queries with respect to the first query, wherein the first rank is calculated based on similarity between the first query and each of the queries at a pre-defined value of a weight factor (L), wherein the weight factor (L) indicates an extent of at least one of a semantic similarity and a syntactic similarity between the first query and each of the queries. At 303, the method includes evaluating, at the server (112), an optimum value of the weight factor (L) based on a difference between the respective rank and the first rank. At 304, the method includes receiving, at a computing device (104), the input query on a display of the

computing device. At 305, the method includes computing, at the computing device (104), in response to the input query, an output recommending at least one relevant query selected from the one or more queries in the dataset, wherein the output is computed based on a similarity between the input query and each of the one or more queries at the evaluated optimum value of a weight factor (L) to recommend the at least one relevant query to the user (102) in response to the input query. At 306, the method includes displaying, on the display of the computing device (104), for selection by the user, the output on the at least one relevant query on the computing device. In an embodiment, the method may be statistical.

[0051] FIG. 4A is an exemplary representation (400) depicting a summary of method for recommending at least one relevant query, in accordance with an embodiment of the present disclosure. In an embodiment, receiving the first query and a dataset including the one or more queries may be done by an administrator or administrative personnel using the administrative device (108) using the corresponding input device (107). The respective rank associated with each of the queries with respect to the first query may be assigned by the administrator, based on the domain knowledge of the field related to the first query. The dataset may include the one or more queries ranked in order of relevance of each of the one or more queries with respect to the first query. In an embodiment, receiving the first query and the dataset may be a part of initialization step associated with the method of the present disclosure, as shown in (402), in FIG. 4A.

[0052] FIG. 4B is an exemplary representation (470) depicting a dataset that is received at a computing device (104), in accordance with an embodiment of the present disclosure. As illustrated in FIG. 4B, the dataset may be in form of an excel file (404) of FIG. 4A) including the one or more queries, the respective rank and a corresponding link associated with each query (exemplary link shown in FIG. 4B) giving possible solutions on the inter/intranet depending on the expected use, such that upon accessing the link, relevant information about the query may be accessed. The excel file may include columns including, but not limited to, an identity (ID) number, a title, and the respective rank (not shown in FIG. 4B).

[0053] In an embodiment, a model may be utilized wherein the model may be run at different values of the weight factor (L) (from 0 to 1) and for each value of L, a sum of Squared Rank Difference (SSRD) may be calculated by squaring the difference in respective rank in excel file and the first rank computed by the computing device (104), such that the value of L for which the error or the SSRD may be minimum be considered as a best weight factor, for the first query. As the database (230) may contain several such first queries fed

during the learning phase of the method, the optimum value of L may be derived by averaging all the values of the best weight factor obtained for all the first queries. FIG. 4C is an exemplary representation depicting a summary for evaluation of the weight factor (L), in accordance with an embodiment of the present disclosure.

[0054] In an exemplary embodiment, and as shown in FIG. 4C, the dataset (shown as 450) including the one or more queries may be present in the database (230) of the centralized server (112). The database may also have the first query (one or more) depicted as Q1, Q2,.....Qn (451, 452,....453). The one or more queries in the dataset may be assigned the respective ranks, wherein the dataset (450) may be duplicated for assigning the respective rank with respect to each of the first queries (451, 452,.... 453) to obtain the corresponding one or more copies (454a, 454b,.... 454c) of the dataset (450) with the respective ranks. The first rank may then be computed (as shown in 456a, 456b,... 456c) for each of the one or more queries with respect to the first query, wherein the first rank may be calculated based on similarity between the first query and each of the queries at a pre-defined value of a weight factor (L) in the range of 0 to 1. As shown in (458), for each value of L, a Sum of Squared Rank Difference (SSRD) may be calculated by squaring the difference in respective rank in excel file (454a, 454b,... 454c) and the first rank (456a, 456b,... 456c) computed by the system, such that the value of L for which the SSRD or the error may be minimum be considered as a best weight factor. The best weight factor for each of the first queries (451, 452,.... 453) may be averaged and the final value may represent the optimum value of the weight factor (L) that may be stored in the database (230) until the database is updated. In an embodiment, the steps including computing the first rank and evaluating the optimum weight factor (L) may be done at the server end and may be a part of a learning phase associated with the method of the present disclosure, as shown in self learning module (406) of FIG. 4A.

[0055] In an embodiment, input query may be received from the user (102) using the computing device (104), and as depicted in (412) in FIG. 4A. In an embodiment, before computing the output, the method may include parsing, at the one or more processors (202) of the computing device (104), the input query to produce parsed concepts and keywords to find similarities between the parsed concepts and keywords with the one or more queries. Based on the received input query, the output query may be computed at the computing device (104) by using the optimum weight value derived at the server end (112) that may be updated at the computing device (104) using the network (110). This step may be associated with the usage phase of the method as shown in (408) in FIG. 4A. In an embodiment, before computing the output, the method may include parsing, at the one or more processors (202)

of the computing device (104), the input query to produce parsed concepts and keywords to find similarities between the parsed concepts and keywords with the one or more queries. In the usage phase, the method may compute an output (416) by retrieving the one or more queries in the dataset, stored in the database (as shown in 410) (by the method explained in the previous embodiments) in an order of a final rank associated with relevance of each of the one or more queries with respect to the input query. In an embodiment, the final rank may be obtained, at the optimum weight factor (L), based on combination of similarity scores associated with a semantic similarity and a syntactic similarity between the input query and each of the one or more queries, as shown in (414) of FIG. 4A, wherein the similarity scores may be calculated by using the following weightage:

L x Syntactic similarity + (1 - L) x Semantic similarity,

wherein the final rank may be evaluated at the optimum value of L (derived at the server end).

[0056] FIG. 4D is an exemplary representation (480) depicting an input query entered by a user (102) and an output query generated by the computing device (104), in accordance with an embodiment of the present disclosure. As shown in FIG. 4D, an input query such as "What is Python?" may be typed or provided as input by the user (102) using the computing device (104) as shown in (481). In response, the computing device (104) may generate the output and display the output in the final rank which may be an order of relevance of high to low as shown in (482, 484 and 486), wherein the relevance is indicated on the display of the computing device (104) in terms of the computed similarity score (given in each block 482, 484. 486). Each relevant query may be associated with a link such that upon clicking the at least one relevant query, the user (102) may be directed to any relevant information in the database or an external database. In case, if the link field may be vacant, the system may generate a link to search the query on a search engine for any relevant information. In an embodiment, the number of relevant queries and their relevance may be represented in graphical form for ease of reference and analysis.

[0057] The input query may be in form of any or a combination of a question, a sentence and a set of keywords. In an embodiment, the device, system and method of the present disclosure may be used in any application selected from at least one of a chatbot, an e-learning site, an e-commerce platform and a search engine. The device, system and the method of the present disclosure may provide the user (102) with several benefits such as self-learning, recommending relevant queries, providing a link to get relevant information, representation of the relevant queries as graph and/or logs for ease of access and reference.

[0058] FIG. 5 illustrates an exemplary computer system in which or with which embodiments of the present invention can be utilized in accordance with embodiments of the present disclosure. As shown in FIG. 5, computer system (500) can include an external storage device (510), a bus (520), a main memory (530), a read only memory (540), a mass storage device (550), communication port (560), and a processor (570). A person skilled in the art will appreciate that the computer system may include more than one processor and communication ports. Examples of processor (570) include, but are not limited to, an Intel® Itanium® or Itanium 2 processor(s), or AMD® Opteron® or Athlon MP® processor(s), Motorola® lines of processors, FortiSOC™ system on chip processors or other future processors. Processor (570) may include various modules associated with embodiments of the present invention. Communication port (560 can be any of an RS-232 port for use with a modem based dialup connection, a 10/100 Ethernet port, a Gigabit or 10 Gigabit port using copper or fiber, a serial port, a parallel port, or other existing or future ports. Communication port (560 may be chosen depending on a network, such a Local Area Network (LAN), Wide Area Network (WAN), or any network to which computer system connects. Memory 530 can be Random Access Memory (RAM), or any other dynamic storage device commonly known in the art. Read-only memory (540) can be any static storage device(s) e.g., but not limited to, a Programmable Read Only Memory (PROM) chips for storing static information e.g., start-up or BIOS instructions for processor (570). Mass storage (550) may be any current or future mass storage solution, which can be used to store information and/or instructions. Exemplary mass storage solutions include, but are not limited to, Parallel Advanced Technology Attachment (PATA) or Serial Advanced Technology Attachment (SATA) hard disk drives or solid-state drives (internal or external, e.g., having Universal Serial Bus (USB) and/or Firewire interfaces), e.g. those available from Seagate (e.g., the Seagate Barracuda 7102 family) or Hitachi (e.g., the Hitachi Deskstar 7K1000), one or more optical discs, Redundant Array of Independent Disks (RAID) storage, e.g. an array of disks (e.g., SATA arrays), available from various vendors including Dot Hill Systems Corp., LaCie, Nexsan Technologies, Inc. and Enhance Technology, Inc.

[0059] Bus (520) communicatively couples processor(s) (570) with the other memory, storage and communication blocks. Bus (520) can be, e.g. a Peripheral Component Interconnect (PCI) / PCI Extended (PCI-X) bus, Small Computer System Interface (SCSI), USB or the like, for connecting expansion cards, drives and other subsystems as well as other buses, such a front side bus (FSB), which connects processor (570) to software system.

[0060] Optionally, operator and administrative interfaces, e.g. a display, keyboard, joystick and a cursor control device, may also be coupled to bus (520) to support direct operator interaction with a computer system. Other operator and administrative interfaces can be provided through network connections connected through communication port (560). The external storage device (510) can be any kind of external hard-drives, floppy drives, IOMEGA® Zip Drives, Compact Disc - Read Only Memory (CD-ROM), Compact Disc-Re-Writable (CD-RW), Digital Video Disk-Read Only Memory (DVD-ROM). Components described above are meant only to exemplify various possibilities. In no way should the aforementioned exemplary computer system limit the scope of the present disclosure.

[0061] While the foregoing describes various embodiments of the invention, other and further embodiments of the invention may be devised without departing from the basic scope thereof. The scope of the invention is determined by the claims that follow. The invention is not limited to the described embodiments, versions or examples, which are included to enable a person having ordinary skill in the art to make and use the invention when combined with information and knowledge available to the person having ordinary skill in the art.

ADVANTAGES OF THE PRESENT DISCLOSURE

[0062] The present disclosure provides for a device, system for recommending a relevant query to a user in response to an input query, using a statistical method.

[0063] The present disclosure provides a method for recommending a relevant query that uses a combination of a syntactic approach and a semantic approach.

[0064] The present disclosure provides a device, system and method for recommending a relevant query that may enable enriched user experience.

[0065] The present disclosure provides a device, system and method for recommending a relevant query that may save time/efforts of the user to find relevant information related to the query.

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We Claim:

1. A computing device (104) for recommending at least one relevant query at least partially based on an input query received from a user (102), the computing device (104) comprising:

one or more processors (202) coupled with a memory (204), the memory (204) storing instructions which when executed by the one or more processors (202) causes the computing device (104) to:

receive the input query on a display of the computing device (104);

compute, in response to the input query, an output recommending at least one relevant query selected from one or more queries in a dataset, wherein the output is computed based on a similarity between the input query and each of the one or more queries at an evaluated optimum value of a weight factor (L) to recommend the at least one relevant query to the user (102) in response to the input query; and

display, for selection by the user (102), the output on the at least one relevant query on the display of the computing device (104).

2. The computing device (104) as claimed in claim 1, wherein the one or more processors (202), before computing the output, parse the input query to produce parsed concepts and keywords to find similarities between the parsed concepts and keywords with the one or more queries.

3. The computing device (104) as claimed in claim 1, wherein the dataset is stored in a database of a server (112), and the dataset includes the one or more queries ranked in order of relevance of each of the one or more queries with respect to the first query.

4. The computing device (104) as claimed in claim 1, wherein the optimum value of the weight factor (L) is evaluated, at the server (112) configured to:

receive a first query and the dataset including the one or more queries, wherein each of the queries is associated with a respective rank assigned with respect to the first query;

compute a first rank for each of the queries with respect to the first query, wherein the first rank is calculated based on similarity between the first query and each of the queries at a pre-defined value of a weight factor (L), wherein the weight factor (L) indicates an extent of at least one of a semantic similarity and a syntactic similarity between the first query and each of the queries; and

evaluate an optimum value of the weight factor (L) based on a difference between the respective rank and the first rank.

5. The computing device (104) as claimed in claim 4, wherein the weight factor is a value in the range of 0 to 1, wherein value of weight factor equal to 0 indicates the semantic similarity and the value of weight factor equal to 1 indicates the syntactic similarity.

6. The computing device (104) as claimed in claim 4, wherein the optimum value of the weight factor (L) is obtained based on least error value computed using sum of squared rank difference (SSRD) between the respective rank and the first rank.

7. The computing device (104) as claimed in claim 4, wherein the respective rank associated with each of the queries with respect to the first query is assigned by an administrator, and wherein the first rank is obtained, at the pre-defined value of a weight factor (L), based on combination of similarity scores associated with the semantic similarity and the syntactic similarity between the first query and each of the queries.

8. The computing device (104) as claimed in claim 1, wherein the input query is in form of any or a combination of a question, a sentence and a set of keywords, wherein the output is recommended in order of a final rank associated with relevance of each of the one or more queries with respect to the input query, and wherein the final rank is obtained, at the optimum weight factor (L), based on combination of similarity scores associated with a semantic similarity and a syntactic similarity between the input query and each of the one or more queries.

9. A system (100) for recommending at least one relevant query at least partially based on an input query received from a user, said system comprising:

a computing device (104) as claimed in claim 1; and

one or more server computers (112) having at least one processor (202), connected to an interconnected network of computers, and communicably coupled to the computing device, the one or more server computers (112) configured to:

receive a first query and a dataset including one or more queries, wherein each of the queries are associated with a respective rank assigned with respect to the first query;

compute a first rank for each of the queries with respect to the first query, wherein the first rank is calculated based on similarity between the first query and each of the queries at a pre-defined value of a weight factor (L), wherein the weight factor (L) indicates an extent of at least one of a semantic similarity and a syntactic similarity between the first query and each of the queries; and

evaluate an optimum value of the weight factor (L) based on a difference between the respective rank and the first rank.

10. A method (300) for recommending at least one relevant query at least partially based on an input query received from a user (102), said method comprising:

receiving, at a server (112), a first query and a dataset including one or more queries, wherein each of the queries are associated with a respective rank assigned with respect to the first query;

computing, at the server (112), a first rank for each of the queries with respect to the first query, wherein the first rank is calculated based on similarity between the first query and each of the queries at a pre-defined value of a weight factor (L), wherein the weight factor (L) indicates an extent of at least one of a semantic similarity and a syntactic similarity between the first query and each of the queries;

evaluating, at the server (112), an optimum value of the weight factor (L) based on a difference between the respective rank and the first rank;

receiving, at a computing device (104), the input query on a display of the computing device;

computing, at the computing device (104), in response to the input query, an output recommending at least one relevant query selected from the one or more queries in the dataset, wherein the output is computed based on a similarity between the input query and each of the one or more queries at the evaluated optimum value of a weight factor (L) to recommend the at least one relevant query to the user (102) in response to the input query; and

displaying, on the display of the computing device (104), for selection by the user (102), the output on the at least one relevant query on the computing device.

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ABSTRACT

A SYSTEM FOR RECOMMENDING A RELEVANT QUERY USING A STATISTICAL METHOD

The present disclosure relates to a computing device (104), system (100) and method (300) for recommending at least one relevant query at least partially based on an input query received from a user (102). The computing device (104) comprises one or more processors (202) to receive the input query on a display, compute, in response to the input query, an output recommending at least one relevant query selected from one or more queries in a dataset, wherein the output is computed based on a similarity between the input query and each of the one or more queries at an evaluated optimum value of a weight factor (L) to recommend the at least one relevant query to the user (102) in response to the input query and display, for selection by the user (102), the output on the at least one relevant query on the display of the computing device (104).

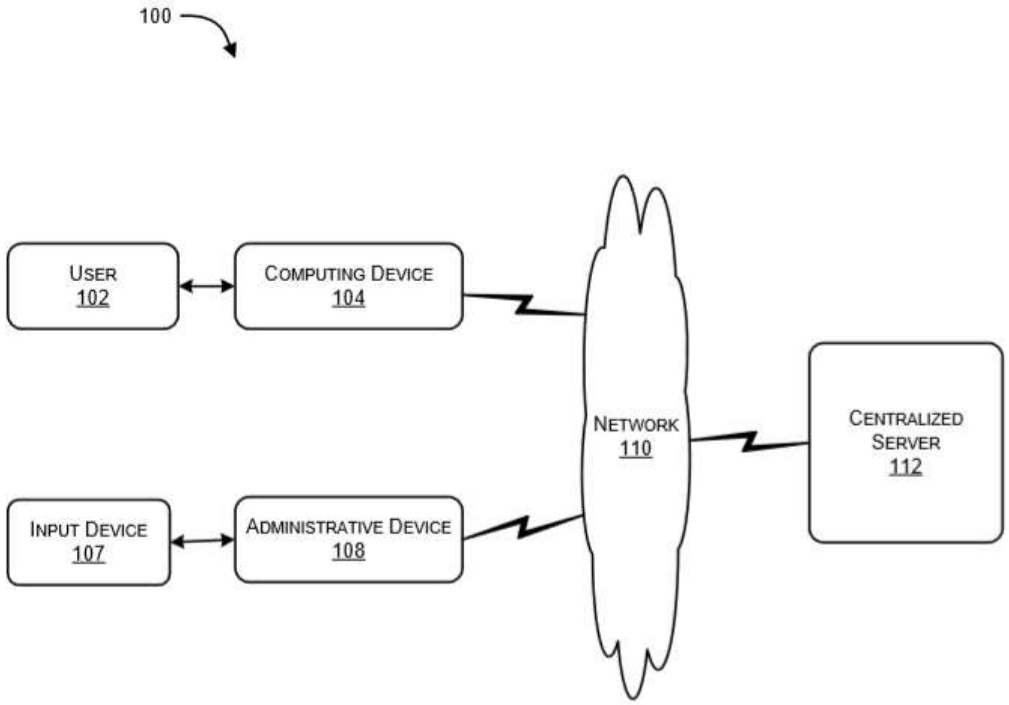

FIG. 1

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